

## C-A OPERATIONS PROCEDURES MANUAL

### 6.1.3 Responding to Chipmunk Alarms

Text Pages 2 through 12

#### Hand Processed Changes

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### 6.1.3 Responding to Chipmunk Alarms

#### 1. Purpose

- 1.1 The purpose of this procedure is to provide the MCR Operations Group with instructions on responding to Chipmunks that alarm in the Main Control Room (MCR) or in the experimental areas.
- 1.2 Acronyms and Definitions:
  - 1.2.1 Chipmunk - area radiation monitor.
  - 1.2.2 Chipmunk Alarm Level - the level of dose rate in mrem/hour that will cause an alarm in the Main Control Room.
  - 1.2.3 Chipmunk Interlock Level - the level of dose rate in mrem/hour that will interlock the AGS.
  - 1.2.4 DNA - Does not answer; no communication with the device.
  - 1.2.5 RCT – Radiological Control Technician.
  - 1.2.6 Interlock - closing of the AGS beamstops preventing beam injection, and preventing acceleration of the beam in the AGS.
  - 1.2.7 MCR - Main Control Room.
  - 1.2.8 OC - Operations Coordinator.
  - 1.2.9 Parity Error - garbled transmission of data; in this case Chipmunk data.
  - 1.2.10 Security PC - a computer devoted to logging the status and history of the security system. It is an IBM P.C. at MCR\_2.
  - 1.2.11 DEVICE READ ERROR - The Chipmunk Monitor program is unable to get a report from the station for that device.
  - 1.2.12 DATACON ERROR - The controller is reporting a datacon read status for the device that is not normal (most likely, DNA).
  - 1.2.13 LOW COUNT – The device did not accumulate more than six counts in the last ten minute period.
  - 1.2.14 DOSE RATE HIGH - The calculated dose rate per hour for the device exceeded the alarm limit.

### 1.3 Index to Procedure

1.3.1 Response to Faulty Equipment -- see step 5.2.

1.3.2 Response to High Radiation Levels or Multiple Alarms -- see Step 5.3.

1.3.3 Estimating Dose following High Levels or Multiple Alarms -- see step 5.4.

1.3.4 Alarms of Unknown Causes -- see step 5.7.

1.3.5 Persistent Alarms -- see step 5.8.

1.3.6 Response to Telephoned Report of Alarming Chipmunk -- see step 5.10.

## 2. **Responsibilities**

2.1 MCR Operators and OC's are responsible to investigate each Chipmunk alarm.

2.2 The OC is responsible for approving tune changes and other configuration changes in response to Chipmunk alarms.

2.3 The on-duty RCT is responsible to perform the radiation surveys called for in this procedure.

## 3. **Prerequisites**

3.1 The Security PC and the program SECURITY must be running.

3.2 Programs ADT, ART must be running.

3.3 The program Chipmunk Viewer need not be running but must be operational.

3.4 Qualified and trained MCR Operators, OCs, and HP Technicians.

## 4. **Precautions**

4.1 The AGS beam stops shall be closed if the Security PC is unable to function.

## 5. **Procedure**

5.1 ENSURE the Security PC is scanning and that Chipmunk alarms can be received.

### 5.2 **Response to Faulty Equipment**

**Note:**

IF ADT, ART programs or CDC Chipmunk device/program ARE NOT running, THEN the AGS primary beam stops MAY REMAIN OPEN until an interlock occurs.

5.2.1 IF the CST.911.DTCN\_AC CST.921.VME CDC.921.CHIPMUNK or CDC. CHIPMUNK is down, THEN the OC must appoint trained radiation workers to locally monitor non-interlocking Chipmunks in affected occupied areas in order to keep the primary beam stops open.

**Note:**

The “921” devices are required only for fast (H10-U Line)

5.2.2 CALL the Facility Manager ( see [C-A-OPM-ATT 10.1.a](#)) after 24 hours of chipmunk system downtime for advice as to whether or not to continue with administrative controls or to shutdown the program.

**Note:**

DNA or PARITY errors reported by Chipmunks imply an inability to receive alarms and an inability to acquire data to be used to determine integrated dose.

5.2.3 If the Chipmunk or associated computer hardware gives a malfunction indication and the cause is not known immediately, do the following:

5.2.3.1 IF the unit also has interlocking capability, THEN refer to [C-A-OPM 6.1.2](#).

5.2.3.2 IF the unit is a non-interlocking Chipmunk and the area is generally OCCUPIED, THEN the OC shall require that someone, for example RCT or a trained User, monitor the Chipmunk locally and report to the MCR when the Chipmunk reads a dose rate at or above its alarm limit.

**Note:**  
IN LIEU OF local monitoring, the OC may require that access to the area be controlled.

5.2.3.3 IF the unit is a non-interlocking Chipmunk that monitors an area that is generally UNOCCUPIED, THEN have RCT control access to the area. For example, outdoor areas may be barriered off. Access may be permitted, for short periods, for personnel wearing self-reading dosimeters.

5.2.4 The OC shall have the malfunctioning unit repaired as soon as practicable.

5.2.5 IF a DEVICE READ ERROR is observed, THEN view the reading in spreadsheet and contact a controls expert.

5.3 Response to High Radiation Levels or Multiple Alarms

5.3.1 IF a Chipmunk ALARMS at a rate greater than 100 mrem/hour, OR IF more than one chipmunk ALARMS SIMULTANEOUSLY; that is, within five seconds and the alarm is not associated with tuning or a known fault, THEN do the following:

**Note:**  
NM061, NM09, NM034, NM051, NM078, NM020 do not count in the tally for simultaneous alarms.

5.3.1.1 DISPATCH RCT to the survey near the unit(s) in order to confirm the reading(s).

5.3.1.2 IF the readings are determined to be false, THEN go to step 5.2.3 which deals with response to faulty hardware.

**Note:**  
All accessible or occupied areas within about 10 to 100 feet should be checked. The Chipmunk should have been located to “see” the highest dose rate possible, or be responsive to the highest dose rate possible. If RCT feels the Chipmunk is shadowed by nearby shielding, walk around and survey the levels in the area. DO NOT climb fences or barriers.

- 5.3.2 IF the high alarm reading is greater than 100 mrem/hour OR IF the multiple simultaneous alarms are determined to be real and not associated with tuning or a known faulty, THEN reduce the beam to the affected area(s) so that the Chipmunk(s) are BELOW the alarm limit.

5.3.2.1 NMO61 -- BLIP Pump Room

**Note:**

The alarm limit for NMO61 is 10 mrem/hour and the interlock limit is 250 mrem/hour.

- 5.3.2.1.1 IF NMO61 is alarming, THEN determine that the BLIP Pump Room door is reset using the Security System Computer at MCR\_2.

- 5.3.2.1.2 IF the door is reset, THEN take no further action even if the Chipmunk goes above 100 mrem/hour.

- 5.3.2.1.3 IF the Pump Room Door is not reset, THEN determine if the Pump Room is occupied.

- 5.3.2.1.4 IF the Pump Room is occupied, THEN inform the occupants of the dose rate and indicate that they must have their work reviewed by the RCT and they must obtain a mini-RWP or Job-Specific RWP.

5.3.2.2 NMO51 - AGS FEB GATE 2 (also known as UGI1) or NM078 - FEB Spur (zero degree line)

**Note 1:**

The Response is the same for both chipmunks

**Note 2:**

U upstream good can be determined by looking at the Panel View of MCR\_2 if PASS is operational or by verifying padlocks are in place at UGI1 and UGE1.

- 5.3.2.2.1 IF NMO51 and/or NMO78 alarms, THEN verify that U upstream sweep is good (no gates have been opened - see PASS panel at MCR\_2)

- 5.3.2.2.2 IF the U upstream sweep is good, then the chipmunk(s) is not used for personnel protection and alarms may remain on the Alarm Display Task (ADT) screen.

5.3.2.2.3 IF the U upstream sweep is not good AND persons are in

**Note:**

When the U line sweep is good personnel protection is provided by NMO213 (UGE1) and NMO211 (U line Igloo).

the U upstream line, THEN confirm that the neutron monitor has been set to interlocking mode by Health Physics.

5.3.2.2.4 IF the U line sweep is not good AND the neutron monitor is NOT in interlocking mode THEN

5.3.2.2.4.1 secure the beam to U upstream (safe off H10 Ejector and UD1-2)

5.3.2.2.4.2 set the neutron monitor to the mode appropriate for the expected state of the U upstream.

5.3.2.2.4.3 re sweep the area as soon as practical.

5.3.2.2.4.4 restore beam to AGS as required

**Note:**

When the sweep is good the neutron monitor should be set to the non-interlocking mode

5.3.2.3 NMO150 and NMO151 @ TtB 12MW30

**Note:**

The chipmunks are used to limit deuteron intensity in TtB by looking at particles scattered off 12MW30. ~~The alarm level is 30mRem for each.~~

5.3.2.3.1 IF NMO150 or NMO151 alarm during operations with deuterons, THEN ~~contact the Tandem Control Room to investigate the source of the alarm ensure that the hourly average dose rate remains below the alarm limit. The alarm limit and hourly dose rate can be found in ChipmunkViewer.~~

5.3.2.4 NMO401 @ Railroad Avenue

5.3.2.4.1 IF you observe on the AGS alarm display a NM401 sisScaler.5a-ps2.1 RANGE ERROR alarm, THEN (after one such event)

- 5.3.2.4.1.1 investigate the source of the problem
- 5.3.2.4.1.2 operate with only six bunches per ring if necessary
- 5.3.2.4.1.3 review the PostMortem loss monitor data and contact the LossMonitor system cognizant physicist for assistance
- 5.3.2.4.1.4 review loss monitor data and contact the cognizant accelerator physicist for assistance
- 5.3.2.4.1.5 Contact the RHIC liaison physicist for assistance
- 5.3.2.4.1.6 Do not assume normal operation until the source of the problem is found and the problem fixed, OR if given explicit permission by the RSC Chairperson and the C-AD Associate Chairperson for Safety, to resume normal operation;

#### 5.3.2.5 NMO219 & NMO221 @WD7

- 5.3.2.5.1 IF you observe on the AGS alarm display an NMO219 and/or NMO221 alarm during RHIC operation or AtR setup THEN ignore it, the alarm should be turned off.
- 5.3.2.5.2 IF you observe on the AGS alarm display an NMO219 and/or NMO221 alarm periods other than RHIC operation or AtR setup THEN respond appropriately according to this procedure.

- 5.3.3 IF the ALARMING Chipmunk is inaccessible, e.g., C-14 or K-7 Ring Escape Hatches, MAKE measurements at the gate used to enter the area, if the alarm is not caused by tuning or a known fault.
- 5.3.4 IF the area dose rate 10 to 100 feet away from the Chipmunk is higher by a factor of TWO or more than the Chipmunk's dose rate that is recorded in the MCR, THEN:
  - 5.3.4.1 REDUCE beam for the affected area until the highest readings in the area are BELOW the alarm limit set for the nearest Chipmunk.
  - 5.3.4.2 CALL the Liaison Physicist for the affected area to inform him/her of what has transpired.
  - 5.3.4.3 REQUEST the Liaison Physicist to have the RSC review the location of the Chipmunk in order to ensure the area is appropriately protected.
  - 5.3.4.4 RECORD these actions in the OC Log.



5.4 Estimating Dose Following High Level or Multiple Alarms that are not Caused by Tuning or a Known Fault

- 5.4.1 Calculate the dose seen by the Chipmunk during the last hour using Chipmunk Viewer.
- 5.4.2 VIEW the dose rate history for the past few hours.
- 5.4.3 ESTIMATE the dose rate in each of the last twelve five-minute intervals, and add up the twelve numbers.

5.4.3.1 FOR EXAMPLE,

The Chipmunk at the North Conjunction Area shows the following dose rates in mrem/hour for the last one hour interval for each of the 12 five-minute bins: 10, 1, 5, 5, 1, 1, 1, 1, 1, 1, 3000, 3000. The average is

$$\frac{10 + 1 + 5 + 5 + 1 + 1 + 1 + 1 + 1 + 1 + 3000 + 3000}{12} = 502 \text{ mrem/h}$$

**Note:**

The Chipmunk Viewer will determine the last hour average for you if you fill the time axis with data (last hour at extreme right of display).

- 5.4.4 Have RCT DETERMINE if there was partial or full-time occupancy in the area(s) of interest during the last hour.
- 5.4.5 OC shall CONTACT the Facility Manager (see [C-A-OPM-ATT. 10.1.a](#)) and alert him/her if you believe:
  - 5.4.5.1 A RADIATION WORKER was given an unexpected exposure GREATER THAN 100 mrem as a result of these brief high-dose rates.
  - 5.4.5.2 A NON-RADIATION WORKER was given an unexpected exposure GREATER THAN 20 mrem as a result of these brief high-dose rates.
- 5.4.6 IF the Facility Manager declares a DOE Reportable Occurrence THEN follow his/her instructions in addition to completing the rest of this procedure.

- 5.5 ATTEMPT to define the cause of the alarms if they are not caused by tuning or a known fault.
- 5.6 IF CAUSE is determined, THEN CORRECT the problem.
  - 5.6.1 RECORD corrective action in the OC Log.
- 5.7 Alarms of Unknown Causes
  - 5.7.1 REGARDLESS of the potential for high exposure, IF you average at or above the ALARM limit, YOU MUST REDUCE beam OR SHUT OFF beam from the area until the average remains BELOW the ALARM limit, OR CONTROL ACCESS to the area to prevent exposure.
  - 5.7.2 IF NO cause is determined AND IF the dose rate at the Chipmunk location, as calculated for the hour, is ABOVE the ALARM limit, THEN the OC must instruct HP to CONTROL ACCESS to the affected area, OR REDUCE INTENSITY to the affected area so that the dose rate at the Chipmunk is below the ALARM limit.
  - 5.7.3 IF it is desirable to control access, THEN POST the radiation level, and PUT UP radiation-tape barriers for levels less than 100 mrem/h.
  - 5.7.4 DO NOT ALLOW hourly-average levels above 100 mrem/h even if access to the unoccupied area could be strictly controlled. YOU MUST reduce beam intensity instead.
  - 5.7.5 IF the alarm on the screen corresponds to one of the counting houses (trailers) or work areas, THEN CONTACT the appropriate experiment or group and ALERT them to the alarm and confirm that they are aware of the levels.
    - 5.7.5.1 ASK them if any changes were made to their secondary beam tune.
    - 5.7.5.2 IF A CHANGE to the secondary beam tune is the cause of these abnormal radiation levels, CORRECT the problem and log the corrective actions taken.
    - 5.7.5.3 RESTORE beam intensity to the affected area.
    - 5.7.5.4 CONFIRM that the alarm is cleared from the screen.

## 5.8 Persistent Alarms

5.8.1 IF the problems persist in either locating the source of the alarms or in ridding the ADT program (MCR display screen) of the alarm, THEN MAINTAIN a reduced intensity to the affected area or control access and DO the following:

5.8.1.1 CONSULT with the Liaison Physicist for the affected area.

5.8.1.2 CONSULT with the Chair of the Radiation Safety Committee or his/her designate.

5.8.1.3 CONSULT with the Radiological Control (RC) Representative, or designee.

5.8.1.4 RECORD these actions in the OC Log.

5.9 IF the problem is not resolved, THEN MAINTAIN a reduced intensity to the affected area or control access to the area. IF access is controlled, beam may be secured for short periods for the affected area such that the hourly average dose rate is below 100 mrem/hour.

5.9.1 RECORD these actions in the OC log.

5.9.2 CONTACT the Facility Manager (see [C-A-OPM-ATT. 10.1.a](#)) and await further instructions.

## 5.10 Operator Response to Telephoned Report of Alarming Chipmunk

5.10.1 While on the telephone ask the appropriate caller:

5.10.1.1 What dose rate they read on the Chipmunk?

5.10.1.2 Whether the area is normally occupied?

5.10.1.3 If an experimenter has called, whether they have changed their beam tune?

5.10.1.4 Proceed as per step 5.3 or 5.7 as appropriate and follow the subsequent steps.

**6. Documentation**

- 6.1 HP Log -- will be a record of any calls from MCR that regard Chipmunk alarms and will be a record of any additional information required by any applicable (RC) Division procedure.

**7. References**

- 7.1 [C-A-OPM-ATT. 10.1.a, "Occurrence Notification Call List"](#).

**8. Attachments**

None